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Each of the freewheels is acted on by the end of a linkage with a movable fulcrum; the opposite end of the linkage is driven with a reciprocating motion by contact with a respective cam keyed to the input shaft of the gearbox. The eccentricity of the cams and their relative offset are such as to convert the reciprocating motion of the linkages into an intermittent rotary motion of the freewheels so as to rotate the output shaft with a preselected direction of rotation and at a predetermined speed. Adjustment of the position of the movable fulcrum, which is disposed in a position between opposite ends of the linkage, determines the preselected transmission ratio between the input shaft and the output shaft of the gearbox. A gearbox having the features outlined above is known from DE 844522. Moreover, a spring with a resilient biasing function is provided to return each freewheel to the initial position after each half turn of the input shaft (the cams are typically offset by 180°). An example of a gearbox devised for applications in metering devices of sowing machines is known from DE 3615819.

Description of the invention

A main object of the present invention is to provide a gearbox for applications of the above-mentioned type in which the rotary motion of the gearbox output shaft, which is subjected to the intermittent and reciprocating motion of each of the freewheels keyed thereto, is rendered more uniform.

Another object is to render the operation of the transmission members of the gearbox independent of any resilient biasing means of the type provided in known solutions, so that the stresses acting on these members are substantially uniform at the respective rates of rotation, and are independent of the position in which the gearbox is mounted.

These objects and yet others which will be pointed out below are achieved by the invention by means of a gearbox formed in accordance with the appended claims.

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CLAIMS

1. A gearbox, particularly for transmission systems in devices (2) for metering granular and/or materials in powder form, comprising a pair of shafts, that is, a drive-input shaft (5) and a drive-output shaft (6), respectively, there being
5 provided on the drive-output shaft (6) at least one pair of coaxial freewheels (8), on each of which an end of a respective linkage (10) carrying a movable fulcrum means is active, the opposite end of each linkage being driven with a reciprocating oscillatory motion about the fulcrum means by an eccentric device provided on the drive-input shaft (5) in order to convert the
10 reciprocating oscillatory motion into an intermittent rotary motion of each freewheel (8) and consequently to bring about a rotary motion of the drive-output shaft (6) in a preselected direction of rotation, the drive-input shaft (5) comprising at least one pair of cranks with eccentric pins (11) and each linkage (10) comprising a respective element (13) substantially similar to a
15 connecting rod having a first end (13a) connected kinematically to the corresponding freewheel (8) and a second, opposite end (13b) articulated on the respective pin (11) of the crankshaft (5) with a capability for rotary and translational movement relative to the pin (11), the movable fulcrum means comprising, for each connecting-rod element (13), a respective fulcrum pin
20 (18), each fulcrum pin (18) being movable, in adjustable manner, between the opposite ends (13a, 13b) of the connecting-rod element (13) so as to define different lever arms (B1, B2) between said ends and consequently to adjust the transmission ratio between the drive-input shaft (5) and the drive output-shaft (6) of the gearbox, characterized in that each fulcrum pin (18) has a
25 first end (18a) restrained on a stationary structure of the gearbox and an opposite second end (18b) restrained on the corresponding connecting-rod element (13) to constitute the centre of the rotation of said connecting rod

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element during the reciprocating oscillatory motion relative to the drive-input shaft, said first end (18a) of the fulcrum pin (18) being guided slidably in a wall of a casing constituting the gearbox housing (3) and the second end (18b) of said fulcrum pin being engaged rotatably and slidably in a seat (21) formed in the corresponding connecting-rod element (13).

2. A gearbox according to Claim 1 in which guide means are provided on each of the connecting-rod elements (13) for guiding the second connecting-rod end (13b) on the respective pin (11) of the crankshaft (5) during the eccentric rotary motion of the pins (11) relative to the axis of rotation (X) of the drive-input shaft (5).

3. A gearbox according to Claim 2 in which the guide means comprise, on each connecting-rod element (13), a respective elongate slot-like portion (16) which can be engaged slidably by the corresponding pin (11).

4. A gearbox according to Claim 3 in which the slot-like portion (16) is elongate in a direction transverse the axis of rotation (X) of the drive-input shaft (5) of the gearbox.

5. A gearbox according to Claim 3 or Claim 4 in which the slot-like portion (16) is open at the second end (13b) of the connecting-rod element (13).

6. A gearbox according to Claim 5 in which the open slot-like portion (16) is defined by a pair of opposed, parallel and spaced-apart walls (16a, 16b) between which the corresponding pin (11) of the drive-input crankshaft (5) is guided slidably.

7. A gearbox according to Claim 6 in which at least one sliding block (17) is interposed between the walls (16a, 16b) of the slot (16) and the pin (11), the sliding block (17) having a first surface (17a) and a second surface (17b) which are in sliding contact with the walls of the slot (16) and with the pin (11), respectively.

8. A gearbox according to one or more of the preceding claims in which the eccentric pins (11) provided in the cranks of the drive-input shaft (5) are offset by 180° relative to the axis of rotation (X) of the shaft (5).

9. A gearbox according to one or more of the preceding claims in which each
5 of the freewheels (8) comprises an inner ring (8a) keyed to the drive-output shaft and an outer ring (8b) coaxial therewith and capable of rotating freely or with torque transmission, depending on the direction of relative rotation of the rings, each connecting-rod element (13) being articulated, at the first end (13a), to a collar portion (9) fitted on the outer ring (8b) and fixed for rotation
10 therewith.

10. A gearbox according to Claim 1 in which the second end (18b) of the fulcrum pin is guided in the seat (21) with the interposition of a sliding block (21a) engaged slidably in the seat (21) and coupled rotatably with the pin (11).

15 11. A gearbox according to Claim 1 or Claim 10 in which the seat (21) extends from the first end (13a) of the connecting rod towards the second, opposite end (13b) of the connecting rod.

12. A gearbox according to one or more of Claims 1, 10 and 11 in which actuator means are provided and are active on the fulcrum pins (18) in order
20 to move the position of the fulcrum relative to the connecting rod in an adjustable manner correlated with the preselected transmission ratio between the drive-input shaft (5) and the drive-output shaft (6) of the gearbox.

13. A gearbox according to Claim 12 in which the actuator means comprise, for each fulcrum pin (18), a lever mechanism (23) a free end of which is fixed
25 for rotation with a control shaft (24) and which is articulated on the fulcrum pin (18) with a capability for rotary/translational movement between the fulcrum pin (18) and the lever mechanism (23).

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14. A gearbox according to Claim 13 in which each fulcrum pin (18) is restrained on the respective lever mechanism (23) with the interposition of a sliding block (26) engaged slidably in a seat (27) of the lever mechanism and coupled rotatably with the fulcrum pin (18).
- 5 15. A metering device for the metered delivery of granular and/or materials in powder form, particularly for machines for dispensing the said materials, comprising a gearbox formed in accordance with one or more of the preceding claims for controlling transmission to respective metering members.
- 10 16. An agricultural sowing machine comprising a metering device for the metered delivery of granular seed, formed in accordance with Claim 15.

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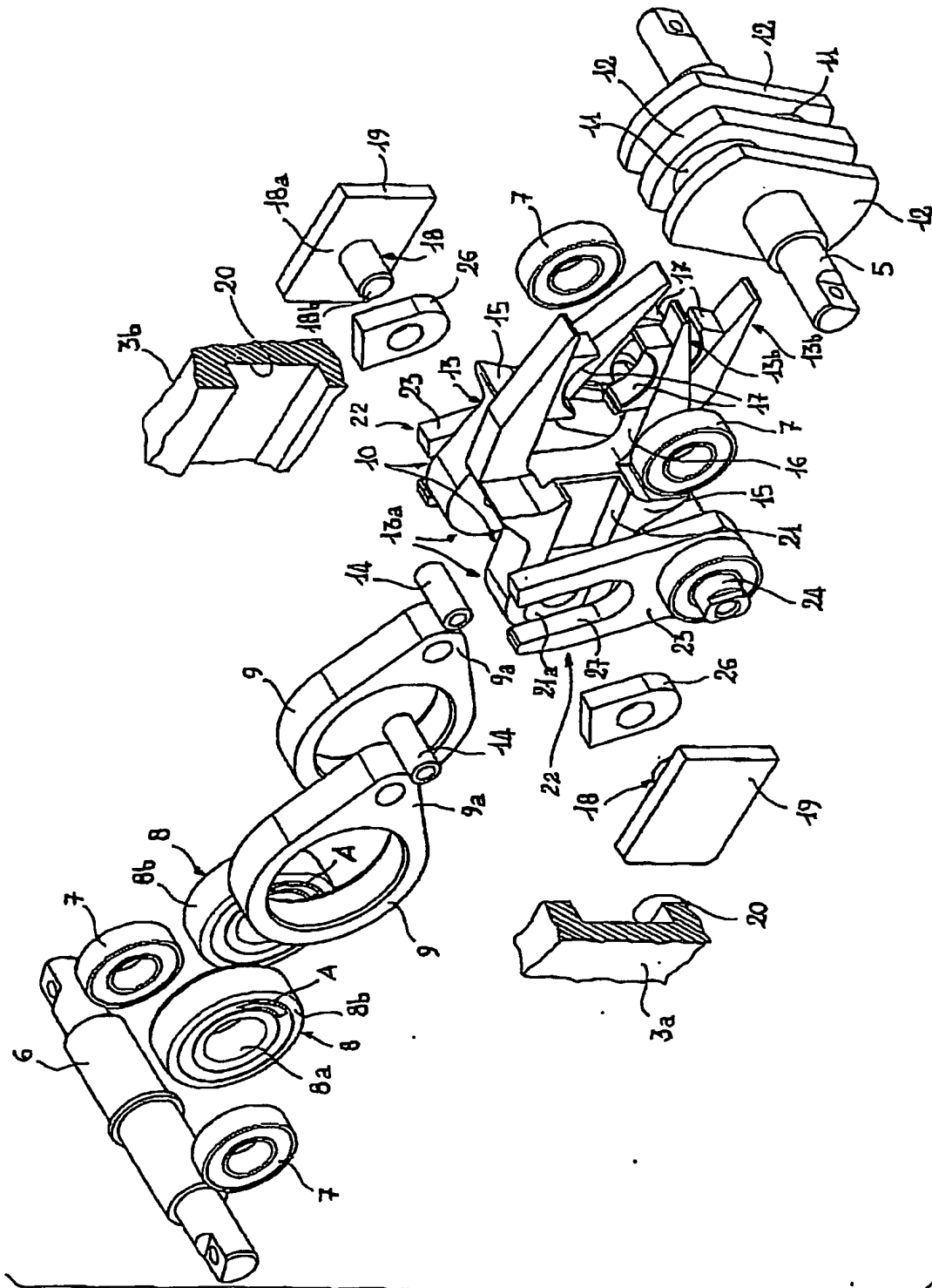


Fig. 3